MIGRATION OF *PAPILIO DEMOLEUS STHENELUS* W. S. MACLEAY (LEPIDOPTERA: PAPILIONIDAE) IN WESTERN AUSTRALIA

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Abstract

Observations of the behaviour of *Papilio demoleus sthenelus* W. S. Macleay in south-west Western Australia are reported. This butterfly is a spasmodic visitor to the Perth metropolitan area where it occasionally breeds on *Citrus*. The migratory nature of the species is reaffirmed and discussed.

Introduction

The chequered swallowtail (*Papilio demoleus sthenelus* W. S. Macleay) occurs throughout mainland Australia but is uncommon in southern parts of Western Australia. Common and Waterhouse (1972) state that the species appears to be migratory, but little is known of its movements. Alexander (1917) noted the build up of several insect species including the chequered swallowtail during summer in the south west of Western Australia and suggested that migration had occurred. Barrett and Burns (1951) refer to the sporadic appearance of the chequered swallowtail in southern Australia but no details of migration are given. The only confirmed record of migration of the chequered swallowtail is that of Smithers and McArtney (1970) for the Northern Territory. Since very few insect migrations have been noted in Western Australia (e.g. Smithers 1974) the following observations may be useful in further studies on the migration of Lepidoptera.

Occurrence in Perth metropolitan area

Observations are reported for the period 1962-1976. During this time *P. d. sthenelus* appeared spasmodically in the Perth metropolitan area. Major invasions occurred in October 1963, October 1968 and April 1976. A small number of specimens were seen in late 1966. Butterflies from the 1963 invasion established themselves near Kalamunda and bred successfully on *Citrus*. However, adults from the local generation dispersed and the species was not seen again in this area until 1966.

The 1968 invasion occurred in late October during hot, sunny weather which followed a period of below average maximum temperatures. Accompanying the influx of chequered swallowtails was a large number of lesser wanderers (*Danaus chrysippus petilia*) and a few sulphurs (*Eurema* sp.). *Eurema* is a northern genus which only rarely appears in the south-west of Western Australia. It is probable that all the species referred to above migrated southwards after temperatures returned to normal October conditions.

In 1976 the first specimens of *P. d. sthenelus* were seen in late March. By late April the species was extremely common in the Perth region and was seen in city streets, suburbs, surrounding rural land and within the jarrah forest of the Darling Range. The earliest specimens captured were tattered and worn but by April most of the specimens were in good condition. Mating behaviour was observed on sunny days near Kalamunda but a search of nearby *Citrus* trees revealed no larval stages. In an area of mixed *Citrus* and market gardening the

butterflies were attracted to young rows of swedes, flying low for long perio of time or alighting on the plants. Within the jarrah forest the butterflies we observed feeding at the creamy-white, tubular flowers of *Styphelia*. Like ma other species of butterflies they were also strongly attracted to *Buddleia* flowe

Migration

On 23 April 1976 a migration of *P. d. sthenelus* was observed north o Perth. Butterflies were seen flying south throughout the shaded area in Fig. 1. Some details of weather conditions and rates of migration at two localities a given in Table 1. The day was warm, sunny and sultry. Butterflies were firs seen at 1000 hours (Western Australian Standard Time), increased in numbe until at least 1500 hours then decreased, the last specimen being seen at 16 hours. At the locality near Regan's Ford, butterflies emerged from *Adenanthos - Eucalyptus* open woodland, crossed a gravel road with a wi scrub verge, then passed across open farmland. A constant southerly directio was maintained by all specimens. Occasionally one would stop to visit *Dava* in flower along the road verge before continuing south. The migration includ males and females. The condition of the wings varied from good to tattered. Th migration was observed over a distance of 100 metres and the butterfli maintained a near constant speed of from 6 to 7 m/sec.

TABLE 1

Weather conditions and rates of migration of *Papilio demoleus sthenelus* at the localit marked by a cross in Fig. 1.

Locality	Wind Direction	Strength (km/hr)	Temp. °C	Time	Migration No./hr/k
(1) 2 km SE Regan's Ford (W. of Mogumber)	N	0 - 10	28 - 30	1100	15
				1130	30
				1200	60
(2) 6.5 km W. Dandaragan	NW	0 - 10	30	1500	86

A similar migration rate and direction was observed at the second loca which is west of Dandaragan and approximately 36 km north of the Reg Ford locality. Here the migration was observed along 70 metres of gravel ro

The behaviour of other day-flying Lepidoptera at these localities is gi in Table 2. Apart from the small number of lesser wanderers, the migra behaviour of *P. d. sthenelus* contrasted with the non-directional movement feeding residents.

The migration probably did not extend very far inland. Near Dalw (*ca.* 130 km ENE of the Dandaragan locality) only a small number of chequ swallowtails was seen from 28.iv.1976 - 2.v.1976. These were either flying or south and probably were local movements of individual adults. A visit to Jurien Bay - Eneabba area on 10.v.1976 revealed only a few resident adults of the migration area shown in Fig. 1. No adults were seen in this area four d later. Likewise, on 25.v.1976, no living specimens were seen near Coorow 90 km NNE of the Dandaragan locality). The migration was therefore of limi duration.

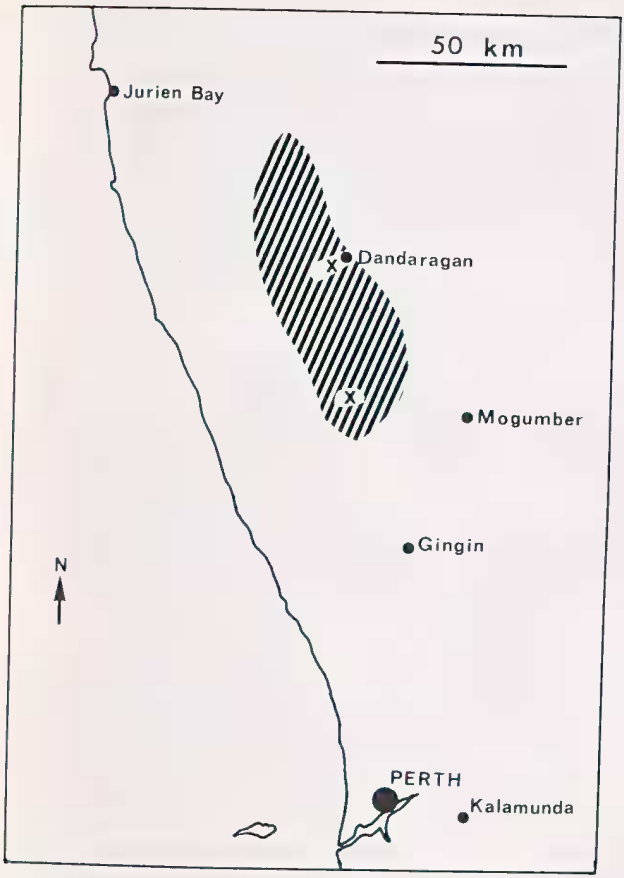

FIG. 1. Map showing region in which migration of *Papilio demoleus sthenelus* was observed (shaded area) and localities (marked by a cross) where detailed observations were made.

TABLE 2

Status of day-flying Lepidoptera at localities given in Table 1.

Species	Occurrence	Behaviour
Papilio demoleus sthenelus	common	migrating south
Delias sp.	rare	visitor
Danaus chrysippus petilia	present	feeding at *Daviesia, Leucopogon*; migrating S
Vanessa kershawi	common	resident; feeding at *Leucopogon*
Precis villida calybe	common	resident; feeding at *Leucopogon*
Ogyris idmo idmo	present	resident
Nacaduba biocellata biocellat.	present	resident; feeding at *Daviesia*
Neolucia agricola occidens	common	resident; feeding at *Daviesia*
Zizina otis	common	resident; feeding at *Daviesia*
Apina sp.	common	resident

At the time of the migration detailed above there was a concomitan increase in the number of adult chequered swallowtails in the Perth metropolita area. The insurge of adults from the north penetrated south into the jarra forest. In dense forest it is difficult to obtain accurate information on butterfly movement because some species tend to fly along fire breaks, tracks and creek beds. For example, on 7.v.1976 in the Gleneagle Forest (*ca.* 45 km SE Perth), o a warm sunny day, during an observation period of 26 minutes, 20 adult chequered swallowtails flew west along a track close to a creek bed. Some individuals stopped and rested on leaves, while others were in hurried flight and two adults flew east. This behaviour probably indicates that the species wa moving locally and was not migrating west through the forest.

Discussion

The spasmodic appearance of *P. d. sthenelus* in the Perth metropolitan are can be explained by the migration of adults from more northern parts of th state. Reasons for the migrations are not known. The migrations do not alway occur at the same time of the year, having been recorded both in late spring and autumn. Though the species could breed in *Citrus* groves near Perth, it has no been successful in establishing itself in this region and has not yet survived fo more than one season. The species appears to follow a migration route which in the author's opinion, will prove to be a pathway taken by other species which migrate into the south west.

Larvae of the chequered swallowtail are reported to feed on *Psoralea* (e.g. Common and Waterhouse 1972). In Western Australia this genus occu throughout the Northern and Eremean botanical provinces. However, on species, *P. cinerea*, penetrates into the Irwin District of the south-west provinc *P. patens*, which has been established as a food plant grows in the north west. Considering the distribution of potential food plants, it seems reasonable tha *P. d. sthenelus* would migrate southwards over the observed migration area discussed above.

The absence of native food plants does not account for the failure of th species to become resident in the lower south west because the larvae of th species could feed on *Citrus*.

Acknowledgements

I would like to thank Allan Burbidge for assisting with observations in th Jurien Bay region and John Dell for observations from Dalwallinu and Cocu

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